Amended Claims

1. (Currently Amended) A fuel cell comprising:

an anode substrate and a cathode substrate and a proton exchange membrane disposed between said substrates;

an anode flow field plate providing a fuel reactant gas flow field adjacent said anode substrate;

a cathode flow field plate providing an oxidant reactant gas flow field adjacent said cathode substrate;

said fuel reactant gas flow field receiving fuel from a fuel reactant gas inlet manifold and exhausting into a fuel reactant gas exhaust manifold;

said oxidant reactant gas flow field receiving oxidant from an oxidant reactant gas inlet manifold and exhausting into an oxidant reactant gas ~~exhaust~~ exit manifold; and

at least one of said flow field plates ~~associated with~~ being porous and having a water flow field on a side of said at least one of said flow field plates opposite the corresponding one of said reactant gas flow fields, said water flow field being dead ended in the region of the corresponding one of said reactant gas inlet manifolds and opening into the corresponding one of said reactant gas exit manifolds, and having a flow restrictor at the exhaust end thereof to maintain the pressure of reactant gas in said one flow reactant gas field above the pressure of reactant gas in said corresponding one of said reactant gas exit manifolds.

2. (Original) A fuel cell stack comprising:

a plurality of fuel cells according to claim 1;

and a gas impervious separator plate separating each of said fuel cells from adjacent ones of said fuel cells, said separator plate selected from (a) a cooling plate having a coolant flow field therein and (b) a solid plate.

3. (Original) A fuel cell according to claim 1 wherein:

said flow restrictor maintains the pressure of reactant gas between 0.2 and 2.0 psi above the pressure in the corresponding exit manifold.

4. (Currently Amended) A fuel cell stack comprising:

a plurality of fuel cells according to claim 1;

a plurality of cooling plates, each having a coolant flow field therein, each of said fuel cells being separated from a fuel cell adjacent thereto by one of said cooling plates, a portion of each of said coolant flow fields coaligned with a portion of at least one of said reactant flow fields in the vicinity of said reactant gas inlet manifold, there being at least one weep hole between said portion of each said coolant flow field and ~~each~~ the one of said reactant gas flow fields coaligned therewith.

5. (Cancelled)

6. (Original) A fuel cell according to claim 1 wherein:

said flow restrictor comprises interdigitated reactant gas flow field channels.

7. (Cancelled)

8. (Currently Amended) A fuel cell according to claim ~~7~~ 1 wherein:

at least one of said substrates is porous ~~substrate~~ and is selected from (a) a hydrophilic substrate, (b) a wetproofed substrate, and c) a substrate which is partially hydrophilic and partially wetproofed.

9. (Original) A fuel cell according to claim 1 wherein:

at least one of said flow field plates is solid with reactant gas flow channels and small holes extending from said channels into said water flow field.

10. (Original) A fuel cell according to claim 9 wherein:

said small holes are filled with a particulate material thereby forming a porous plug.

11. (Cancelled)

Amendment to the Specification

Page 7, line 22 to page 8, line 9:

A second aspect of the present invention alleviates the need to externally humidify one or both of the reactant gases. In one embodiment of this aspect of the invention, illustrated in Figs. 6 and 7, a modified cooler plate 51a has weep holes 57 between the ends 29 of the fuel reactant gas channels in the region of the fuel inlet 34 and the coolant water channels 52 adjacent thereto. This will supply a constant water influx into the water channels 29, 30, 31 to ensure that the anode side of the PEM will be adequately moisturized. In this case, however, pure, deionized water must be used as the coolant. ~~For this embodiment the water pressure must be lower than the reactant inlet pressures, to prevent flooding of the reactant flow fields, and higher than the reactant exhaust pressures to force water into the water flow field.~~ The weep holes 57 may be filled with a particulate filler which increases the resistance to flow and facilitates pressure control between the water and the reactant. This concept may also be used to humidify the oxidant by providing weep holes to the cathode flow field 40 in the vicinity of the air inlet manifold 42.

Respectfully submitted,

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